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Major Article

Prevention and control of health care–associated infections in Iran: A qualitative study to explore challenges and barriers

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Background: Globally, the health and economic burden posed by health care–associated infections (HAIs) remains wide and severe. To curb the burden associated with HAIs, countries, including Iran, aim at HAI prevention and control. This study explores the challenges faced by the Iranian health system in addressing the issues associated with the prevention and control of HAIs.

Methods: A qualitative research method was adopted in exploring the phenomenon. We used the purposive sampling approach in reaching 24 key informants at the national and subnational levels. The thematic framework analysis was conducted for analyzing the interviews.

Results: Five main themes emerged from our study demonstrating the obstacles toward the prevention and control of HAIs. They include governance and stewardship, resources, safety culture, monitoring and surveillance systems, and inappropriate prescription of antibiotics.

Conclusions: Strengthening of reporting and surveillance systems for HAIs coupled with proper governance and stewardship are crucial in order to improve the health and safety of patients. However, the availability of resources, through an intersectoral approach, is essential to achieve sustained output.

Health care–associated infections (HAIs) are infections that patients acquire after 48 hours of admission to a health care facility.[1] HAIs are very common, and a significant proportion of them are preventable.[2] In U.S. hospitals, approximately 1.7 million HAIs occurred in 2002 and approximately 99,000 patients died as the result of HAIs.[3] HAIs are, therefore, a serious threat to patients and a major drain on health care resources.[1,4-9] It is estimated that approximately $9.8 billion is spent annually on HAIs,[4] and $25-$31.5 billion can be saved if 70% of HAIs are prevented.[10] The notion of HAIs is very complicated and multifactorial; therefore, their control needs complex and multidisciplinary solutions. It is argued that the main causes of HAIs are weak surveillance systems, lack of knowledge and attitudes of health professionals, cultural factors, flaws within the health care systems, limited resources, and legal and political constraints.[11-14]

A recent report has shown that a significant proportion of patients have developed HAIs in Iranian hospitals between 2007 and 2010, and 14.8% of these patients have died as a result of HAIs.[15] The exact burden and nature of HAIs, however, have not been well documented in Iran and other developing countries. The ultimate goal of any HAI control initiative is to improve patients' health and prevent death and adverse outcomes.[9,16,17] In Iran in 2007, a national reporting and surveillance system was specifically designed to report and control HAIs. These initiatives however seem to have been faced with many difficulties and challenges. This study aimed to explore the challenges regarding the prevention and control of HAIs faced by the Iranian health system as a developing country.

METHODS

Study design, sampling, and data collection

In Iran, the Ministry of Health and Medical Education (MOHME) is the main institution responsible for provision of health care services, medical education, research, and supervision and regulations.

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All of the public Universities of Medical Sciences (UMS) are affiliated with the MOHME, and the public educational hospitals are affiliated with the UMS.[18] Therefore, the MOHME, UMS, and hospitals are responsible for the control of HAIs at the macro, meso, and micro levels, respectively.

We used a qualitative design with a purposive sampling approach to interview experts (policymakers, technical officers, and hospital directors) from the National Committee of Hospital Infections and other sections in the MOHME, UMS, and private and public hospitals.

A total of 24 semi-structured interviews were conducted between June 2014 and April 2015, including 10 interviews from the MOHME, 7 from UMS, and 7 from hospitals. Each interview lasted 45-120 minutes. Interviews were tape-recorded and transcribed; however, 2 participants were unwilling to have their voices taped; therefore, their conversations were written. Interview questions covered the subjects of resources (human, financial, and materials resources); environmental, cultural, institutional, legal, educational, and pharmaceutic issues; and their contributions toward prevention and control of HAIs. The interview guide was first pretested with 2 participants to ensure its validity. The questions did not differ across the interviewees.

Data analysis

Thematic framework analysis was conducted using MAXQDA 10 software (VERBI Software; Udo Kuckartz, Berlin, Germany). The authors (A.E. and H.S.) transcribed the data in Farsi language and translated them into English. We adopted the framework approach to analyze the data by using the following steps: familiarization, identification of thematic framework, indexing, charting, and mapping and interpretation.[19,20] The World Health Organization's Health Systems Framework[21,22] was used as a guide for the analysis and interpretation of the data.

The authors (A.E. and H.S.) listened to the audiotapes and read the transcripts repeatedly to be sufficiently familiar with the data and have a general overview of it. The data that were associated with the codes and were relevant to the research objectives were discussed and compared. The research team then entered the data, including themes and subthemes, into the relevant charts. Finally, we selected and analyzed the core themes.

We also ensured the trustworthiness of interviews, including credibility, transferability, dependability, and confirmability,[18,23] as follows: member checks and prolonged engagement were adopted to enhance the credibility of our findings. The purposive sampling technique and detailed descriptions ensured that any vague statements were avoided, thereby enhancing the transferability of our findings. Moreover, we applied 3 strategies: data checks, detailed documentation, and used external audit in ensuring the dependability and confirmability of our findings.

Ethical considerations

This study was approved by the Ethics Committee of the Deputy of Research and Technology of Tehran University of Medical Sciences with the Ethical Approval Code: IR.TUMS.REC.1395.2617. We also obtained informed consent from all the participants and assured their anonymity.

RESULTS

The following 5 main themes (challenges) were emerged from our data (Table 1).

Governance and stewardship

Most of our interviewees repeatedly stated the lack of a specific national infection control division as an important challenge hindering the control of HAIs. The primary stewardship in charge of the infection surveillance system is the Office of Communicable Diseases Control in Health Deputy at the MOHME. However, issues regarding patients' safety, treatments, and evaluation are supervised by the deputy of curative affairs within the MOHME.

Table 1
Challenges toward prevention and control of HAIs in Iran, 2015

Themes	Subthemes	Codes
Theme 1: Governance and stewardship	Stewardship	Lack of a national stewardship
		Poor intersectoral collaboration
	Evidence-based policymaking	Lack of local clinical guidelines
		Lack of standards of care
	Priority setting	Prevention and control of HAIs not prioritized at the national level
Theme 2: Resources	Human resources	Shortage of medical staff
		Inadequate training programs
		Inadequate research activities
		Low level of knowledge and awareness
	Financial and material resources	Limited budget
		No financial support
		Inadequate provision of equipment and facilities
		Low-quality materials
Theme 3: Safety culture	Cultivating a negative culture	Nonpractice of handwashing by those who are supposedly assumed to have high level of knowledge regarding the control of HAIs (eg, supervisors)
		Poor attitudes of supervisors toward hand hygiene
		Lack of supportive environment to discuss medical errors (eg, HAIs)
Theme 4: Monitoring and surveillance systems	Reporting system	Lack of comprehensive information system
		Underreporting
	Postdischarge surveillance system	Lack of follow-up system
Theme 5: Prescription of antibiotics	Antibiotic surveillance system	Lack of systems to monitor antibiotic prescribed by physicians
		Inability to control physicians regarding prescription of antibiotics
	Antimicrobial resistance	Overuse of antibiotics
		Misuse of antibiotics
		No consultation before prescription

HAI, health care–associated infection.

One policymaker stated, "Currently there is no single stewardship to control HAIs. Although in some universities the role of health deputy is highlighted, in others the role of treatment deputy is more emphasized."

Moreover, our study revealed poor intersectoral collaboration between deputies and departments involved in the control of HAIs. For example, a technical officer stated, "There is lack of collaboration. Sometimes, task interference and parallel work do occur."

Participants also pointed out the fact that, although there are some national clinical guidelines and protocols, most are translated versions of existing international guidelines, which sometimes might not be pertinent to our local context in aspect of nurse-to-patient ratio, the kinds of equipment and materials, and so forth. One policymaker stated, "A fundamental problem is that most of the time we only translate the international guidelines. The available guidelines are not adjusted according to our local context."

Our findings also revealed a lack of clear regulations and standards of care regarding prevention and control of HAIs. Another finding that came up during the interview from a hospital director was that, "The standard ratio of nurses and doctors to patients in hospitals is also not well defined." Besides, there are no standards for declaring certain rates of HAIs as an emergency case, especially in intensive care units (ICUs) and coronary care units.

> There is no protocol that states the exact catastrophic rate of HAIs in the ICU. We have an infection rate of 45% in some ICUs, but they are considered normal! I think ICU with this rate should be closed. You see, one of the challenges is that, evidence produced are usually not implemented, or when implemented are not enforced! For example, in most countries, they have a lot of antibiotic treatment policies, but we have few, and even with that they are not enforced (technical officer).

An additional finding observed during our study was that although HAIs pose a lot of health and economic consequences on Iran, they have not been prioritized at the national level and are therefore not given the needed attention by policymakers. According to one policymaker, "there are more important problems than HAIs in the country."

Resources

Two subthemes were identified under this subject: human resources and financial and material resources.

Human resources

According to our interviewees, staff shortages exist in the hospitals. As such, there is a mismatch between the number of doctors and nurses per hospital beds. Especially, nurse-to-patient ratios are low in the public hospitals. According to one policymaker, "A nurse should be responsible for only two patients, but practically a nurse attends to about six patients. You see, it is just like playing football; if the players are not adequate, all the rules fail."

Moreover, participants repeatedly mentioned inadequate educational and training programs for medical students, residents, and even health professionals. Interviewees added that only a few studies have been conducted on HAIs in Iran. As a result, there is low level of knowledge and awareness regarding HAIs and their associated risk factor. A hospital director stated, "Control of HAIs in the infectious residency training course in the universities has not been highlighted. Also, research activities in the field of HAIs are not high. Majority of us, I mean we the health professionals, are not even well acquainted with adequate information on HAIs."

Financial and material resources

According to our respondents, there is no special fund or financial support to prevent and control HAIs in Iran. Participants stated that, although the cost of antimicrobial products for preventing HAIs is less compared with the burden posed by HAIs, policymakers and hospital administrators do not make financial provisions for such items. Moreover, there are no incentives for health care workers to promote the prevention of HAIs. A hospital director stated, "The biggest problem for the hospital is budget constraints. No special fund is allocated to control HAIs. We do promote prevention and control of HAIs, yet we are not entitled to receive any extra benefits. I personally do stay till 6 pm, yet my efforts are not recognized and not being motivated for."

Inadequate and low-quality cleaning and sanitation equipment and materials in the hospitals were among the main results why some health care providers refuse to wash their hands after a routine activity. A response given from a hospital director included, "We only have one sink in this ward where all the physicians and nurses use in washing their hands. Besides, some do experience allergic reactions on their skin after use, as such, they have decided not to use it at all."

Safety culture

Although a lot of conferences, seminars, and training workshops are held on the prevention and control of HAIs at the national and subnational levels, patient safety culture is not cultivated within the hospitals. Participants repeatedly stated that health professionals, including doctors, surgeons, and nurses, who are supposedly assumed to have high level of knowledge regarding the control of HAIs, do not often comply with prevention and control strategies of HAIs; for example, they do not practice handwashing during their routine activities, and some personnel prefer wearing gloves instead of washing hands. Furthermore, in the hospitals there is no supportive environment to discuss medical errors, such as HAIs, and finding solutions to prevent them.[24]

> . . .Personally, I was hospitalized recently and during my 10 days stay at the hospital, I never saw the doctors washing their hands as they move from one patient to another. If the University Professors or health professionals whom we are looking up to do not comply with the measures to control infections, then their followers are definitely going to repeat their steps, and a negative culture then cultivates. I think they are not practicing much with regards to hand hygiene, and other strategies for control of HAIs (technical officer).

Monitoring and surveillance system

Lack of efficient and detailed reporting and a postdischarge surveillance system were repeatedly mentioned under monitoring and surveillance systems. Our study disclosed a lack of comprehensive information systems on the management of HAIs. It was also frequently emphasized by study participants that the actual rate of HAIs is underreported. A policymaker stated, "There is insufficient information regarding prevalence, incidence, and the health care costs of HAIs in the country."

Moreover, there is not a postdischarge surveillance system in Iran. This makes it almost impossible for policymakers to identify the patients that may acquire infections and come up with appropriate interventions. One technical officer stated, "Some medical errors such as insertion of infected catheter do cause HAIs, however, they are not reported. We do not have any follow-up systems, we are not informed about them."

Prescription of antibiotics

Our study also revealed that there is no system for monitoring antibiotic prescriptions authorized by physicians. In view of this, surgeons are not restricted with regard to number of antibiotics they prescribe. As such, there has been excessive use and misuse of antibiotics, leading to an increase in antimicrobial resistance cases.

> Now we do not have a complete Health Information System (HIS) that covers antibiotic surveillance. If the current HIS is comprehensive, the pharmatherapists can easily check the prescription of antibiotic. A specialized doctor can constantly prescribe as many antibiotics without any restriction. Due to that, antimicrobial resistance is on the rise (policymaker).

We also found that doctors usually prescribe antibiotics before receiving the results of the culture test they have ordered from the laboratory that confirms the actual etiology (causative agent) of the cases. According to a hospital director, "In the hospitals, broad-spectrum antibiotics are conducted without any consultation, and after two weeks, the culture test of the patient sometimes shows that the microbe is sensitive to other antibiotics."

A policymaker also added that "only few reference laboratories exist in the country. Besides, they also lack quality equipments that meet international standards due to the sanctions and budget constraints. This affects the accuracy of the lab test results."

DISCUSSION

Our findings indicate that governance and stewardship, resources, safety culture, monitoring and surveillance systems, and prescription of antibiotics significantly influence the prevention and control of HAIs.

To our knowledge, this qualitative study was the first of its kind to be conducted in Iran. However, studies across the globe have identified similar findings. Our study indicates that the current HAIs surveillance system of Iran lacks proper stewardship and intersectoral collaboration, resulting in inadequate evidence-based policies to curtail the burden of HAIs. Some studies have indicated that evidence-based guidelines provide essential support to health care personnel in preventing HAIs. However, where guidelines are not contextually emphasized, it becomes unrealistic and mostly impossible to adopt.[25]

Resources (human, financial, and material) can have positive effects on the success of every health initiative, including prevention and control of HAIs.[26,27] Shortage of human resources was repeatedly reported in our study. A higher ratio of nurses per beds may reduce the rate of HAIs. Low level of knowledge and awareness regarding HAIs and their associated risk factors is another challenge because there are low educational and research activities on HAIs. An increase in education can improve both behavior and performance.[25] However, as illustrated in our study and that of others, a high level of knowledge on the control of infections does not necessarily lead to appropriate preventive practices.

Moreover, laboratory culture tests play an important role in the detection and control of infections. Efficient control of infections depends on the ability of laboratories to detect the resistance of pathogens to treatments.[28] In addition, cleanliness and sterilization of equipment decrease the rate of HAIs.[29,30] However, in our study, equipment that promotes the prevention and control of HAIs, such as standard laboratories, was limited in supply. Moreover, amenities that promote personal hygiene, such as sinks, were inadequate, thereby modifying the attitudes and perceptions of personnel toward handwashing.

Patient safety culture encompassing the attitudes, behavior, and values individuals and groups exhibit[31] plays a vital role in achieving the goals and objectives of every health organization and needs to be considered diligently.[17] For example, a positive culture toward hand hygiene, such as regular and effective handwashing, reduces the rate of HAIs.[17,26] A lack of a supportive safety culture in the hospitals is a potential barrier to implement HAIs programs.[24]

Access to information can influence decision-making. It is well-established that accurate data are pivotal for successful HAIs prevention and control programs.[9] However, this is not the case with the Iranian health system. Lack of comprehensive monitoring and surveillance systems for HAIs have led to insufficient evidence-based decision-making. Also, we found that the extent and severity of HAIs are underreported. The national HAI surveillance program ought to be strengthened to address existing flaws, especially with regard to underreporting of HAIs.[15] Moreover, lack of a postdischarge surveillance system in the country makes it somewhat impossible for policymakers to identify patients who may acquire infection and to come up with the needed interventions. Furthermore, lack of a reports and surveillance system on antibiotic and antimicrobial resistance poses a significant challenge to the control of HAIs. Our findings indicate that surgeons are not restricted with regard to the number of antibiotics prescribed and they do not consult infectious disease specialists. As such, there has been excessive use and misuse of antibiotics, resulting in an increase in antimicrobial resistance.

CONCLUSIONS

Based on our findings, several factors can effect prevention and control of HAIs; therefore, multidisciplinary interventions are necessary to eliminate them. A strengthened reporting and surveillance system of HAIs and proper governance and stewardship are crucial in improving the health and safety of patients. However, the availability of resources (human, financial, and material) through an intersectoral approach is essential in achieving significant reduction of HAIs.

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